

## Operating Instructions

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### **BRINKMANN Pressure Boosting Pumps**

**FH11...FH17**



**BRINKMANN PUMPS, Inc.**

47060 Cartier Drive  
Wixom, MI 48393  
USA

Phone: +1 248 926 9400  
Fax.: +1 248 926 9405

[www.brinkmannpumps.com](http://www.brinkmannpumps.com)  
[sales@brinkmannpumps.com](mailto:sales@brinkmannpumps.com)

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# Brinkmann Pressure Boosting Pumps series FH11 ... FH17

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## 1 Indication to the manual

This operating manual gives basic instructions which are to be observed during installation, operation and maintenance of the pump. It is therefore imperative that this manual be read by the responsible personnel and operator prior to assembly and commissioning. It is always to be kept available at the installation site.

### 1.1 Identification of safety instructions in the operating manual

Safety instructions given in this manual non-compliance with which would affect **safety** are identified by the following symbol



Safety sign according with ISO 3864 – B.3.1

or where **electrical safety** is involved, with:



Safety sign according with ISO 3864 – B.3.6

Where non-compliance with the safety instructions may cause a risk to the machine and it's function the word

**ATTENTION**

is inserted.

## 2 Description of the Product

### 2.1 General description of the pump

Pumps of this type are multi-stage rotary pumps. Series FH use closed impellers in order to minimizing power consumption and to optimize hydraulic pump efficiencies.

The pump shaft and the motor shaft are connected by a coupling. The pump shaft is sealed by a rotating mechanical seal.

These Pumps are not self-priming.

Pump and motor form a compact and space-saving unit.

The pumps can be mounted next to the coolant tank or the lined-up pump.

### 2.2 Intended use

In combination with pre-pumps or central coolant supply pumps of series FH work as pressure booster up to 26 bar increase within the limiting application in accordance with table 1.

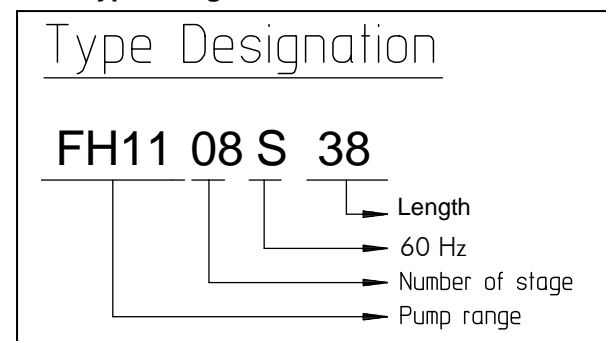
#### Limit of Application (Table 1)

Type	FH11...FH17
Mediums	Industry water, coolant, cooling- and cutting-oils
Kinetic viscosity of the medium	...115 SSU (...25 mm <sup>2</sup> /s)
Temperature of medium	30 ... 175 °F (0 ... 80 °C)
max. inlet pressure	375 PSI (26 bar)
max. operation pressure	775 PSI (54 bar)
Particle-size in the medium	0.04 Inches (1 mm)
min. delivery volume	1% of Q max.
Dry running	The pumps are not suitable for dry running.
Motor cycle time per hour	Motors less 4.0 HP max. 200 from 4.0 HP to 5.4 HP max. 40 from 6.7 HP to 14 HP max. 20 from 15.0 HP and higher max. 15
Ambient temperature	104 °F (40 °C)
Set-up altitude	3280 ft (1000 m)

**ATTENTION**

The pumps are to be operated within their design limits. Applications outside of these limits are not approved. The manufacturer is not responsible for any damages resulting from use of the pumps in such applications.

### 2.3 Type Designation



## 2.4 Technical data

Type	Max. del. pressure spec. weight 1		Max. del. volume		Height		Length		Weight		Power		Noise level <sup>1)</sup> 60 Hz dBA
	PSI	bar	GPM	l/min	H Inches	mm	L Inches	mm	lbs	kg	HP	kW	
FH1102S18	50	3.4	74	275	24.2	615	8.3	212	86.0	39	1.75	1.3	66
FH1103S18	78	5.2	75	285	25.2	641	8.3	212	94.8	43	2.5	1.9	66
FH1104S28	100	6.8	76	290	29.4	747	12.1	308	103.6	47	3.5	2.6	66
FH1105S28	124	8.2	78	300	31.5	801	12.1	308	125.7	57	4.4	3.3	74
FH1106S28	150	10.1	80	310	31.5	801	12.1	308	132.3	60	5.4	4.0	74
FH1107S31	177	11.9	82	320	34.2	869	13.4	340	172	78	6.7	5.0	74
FH1108S38	200	13.8	84	325	36.7	933	15.9	404	176	80			
FH1109S38	222	15.6	87	330	36.7	933	15.9	404	179	81	7.4	5.5	74
FH1110S47	248	17.2	87	330	44.7	1136	19.7	500	229	104	11.5	8.6	77
FH1111S47	276	19.0	88	335					232	105			
FH1112S47	300	20.4	89	340					234	106			
FH1113S50	322	22.1	89	340	46.0	1168	20.9	532	245	111	13.8	10.3	77
FH1114S57	342	23.8	90	350	48.5	1232	23.5	596	249	113			
FH1115S57	362	25.0	90	350					251	114			

1) Noise emissions measured in accordance with  
DIN 45635 at a distance of 39.37 Inches (1 m)

The motor is surface-cooled and compliant with  
DIN IEC 34 and EN 60034 (protection degree IP 55).

Type	Max. del. pressure		Max. del. volume		Height		Length		Weight		Power		Noise level <sup>1)</sup> 60 Hz dBA
	spec. weight 1 PSI	bar	GPM	l/min	H Inches	mm	L Inches	mm	lbs	kg	HP	kW	
FH1402S18	60	4.0	124	460	25.6	651	8.3	212	97.0	44	3.5	2.6	66
FH1403S28	92	6.0	125	475	31.5	801	12.1	308	132.3	60	5.4	4.0	74
FH1404S28	120	8.1	128	490	33.0	837	12.1	308	170	77	7.4	5.5	74
FH1405S38	156	10.2	130	500	40.9	1040	15.9	404	220	100	11.5	8.6	77
FH1406S38	182	12.2	132	510					223	101			
FH1407S47	218	14.4	135	520	44.7	1136	19.7	500	269	122	13.8	10.3	77
FH1408S47	242	16.4	138	530	45.0	1144	19.7	500	287	130	17.0	12.6	79
FH1409S57	277	18.6	142	545	60.8	1545	23.5	596	298	135	23	17.3	81
FH1410S57	300	20.8	143	550					300	136			
FH1411S66	330	22.8	146	560	64.6	1641	27.2	692	306	139			
FH1412S66	360	25.0	148	570					309	140			

1) Noise emissions measured in accordance with  
DIN 45635 at a distance of 1 m

The motor is surface-cooled and compliant with  
DIN IEC 34 and EN 60034 (protection degree IP 55).

Type	Max. del. pressure		Max. del. volume		Height		Length		Weight		Power		Noise level <sup>1)</sup> 60 Hz dBA
	spec. weight 1 PSI	bar	GPM	<i>l/min</i>	<b>H</b> Inches	<i>mm</i>	<b>L</b> Inches	<i>mm</i>	lbs	<i>kg</i>	HP	<i>kW</i>	
FH1702S18	60	4.1	142	550	27.8	705	8.3	212	120	54.5	4.4	3.3	72
FH1703S28	94	6.4	148	555	33.0	837	12.1	308	169	76.5	6.7	5.0	74
FH1704S28	124	8.4	150	570	37.1	943	12.1	308	216	98	11.5	8.6	77
FH1705S38	158	10.8	153	580	40.9	1040	15.9	404	262	119	13.8	10.3	77
FH1706S38	190	13.1	158	600	41.3	1048	15.9	404	278	126	17.0	12.6	79
FH1707S47	220	15.2	160	605	57.0	1449	19.7	500	326	148	23	17.3	81
FH1708S47	252	17.4	162	610					329	149			
FH1709S57	283	19.7	165	620	60.8	1545	23.5	596	331	150			
FH1710S57	312	21.8	167	630	62.8	1594	23.5	596	355	161	29	21.3	81
FH1711S66	346	24.0	170	640	66.5	1690	27.2	692	362	164			

1) Noise emissions measured in accordance with  
DIN 45635 at a distance of 1 m

The motor is surface-cooled and compliant with  
DIN IEC 34 and EN 60034 (protection degree IP 55).

### 3 Safety instructions

When operating the pump, the safety instructions contained in this manual, the relevant national accident prevention regulations and any other service and safety instructions issued by the plant operator are to be observed.

#### 3.1 Hazards in the event of non-compliance with the safety instructions

Non-compliance with the safety instructions may produce a risk to the personnel as well as to the environment and the machine and results in a loss of any right to claim damages.

For example, non-compliance may involve the following hazards:

- Failure of important functions of the machines/plant
- Failure of specified procedures of maintenance and repair
- Exposure of people to electrical, mechanical and chemical hazards
- Endangering the environment due to hazardous substances being released

#### 3.2 Unauthorized modes of operation



- Pump may not be used in potentially explosive environments!
- Pump and discharge piping are not designed to hold any weight and may not be used as a step ladder.

#### 3.3 Remaining Risk



##### **Risk of Injury!**

Risk of squeezing or crushing body parts when installing or removing the pump exists. Proper and secured lifting tools must be used.

##### **Risk of burns!**

The pump must have cooled down sufficiently prior to commencing any repair, maintenance or installation.

#### 3.4 Qualification and training of operating personnel

The personnel responsible for operation, maintenance, inspection and assembly must be adequately qualified. Scope of responsibility and supervision of the personnel must be exactly defined by the plant operator. If the staff does not have the necessary knowledge, they must be trained and instructed, which may be performed by the machine manufacturer or supplier on behalf of the plant operator. Moreover, the plant operator is to make sure that the contents of the operating manual are fully understood by the personnel.

#### 3.5 Safety instructions relevant for operation

- If hot or cold machine components involve hazards, they must be guarded against accidental contact.
- Guards for moving parts (e.g. coupling) must not be removed from the machine while in operation.
- Any leakage of hazardous (e.g. explosive, toxic, hot) fluids (e.g. from the shaft seal) must be drained away so as to prevent any risk to persons or the environment. Statutory regulations are to be complied with.
- Hazards resulting from electricity are to be prevented (see for example, the VDE Specifications and the bye-laws of the local power supply utilities).
- The pumps are only secured safely if properly attached to the floor and to the lined-up pump or tank.
- The female threads on the motor **MUST NOT** be used to lift the entire pump and motor assembly.

#### 3.6 Safety instructions relevant for maintenance, inspection and assembly work

Any work on the machine shall only be performed when it is at a standstill, it being imperative that the procedure for shutting down the machine described in this manual be followed.

Pumps and pump units which convey hazardous media must be decontaminated.

On completion of work all safety and protective facilities must be re-installed and made operative again. Prior to restarting the machine, the instructions listed under "Start up" are to be observed.

#### 3.7 Signs on the pump

It is imperative that signs affixed to the machine, e.g.:

- arrow indicating the direction of rotation
- symbols indicating fluid connections

be observed and kept legible.

#### 3.8 Unauthorized alterations and production of spare parts

Any modification may be made to the machine only after consultation with the manufacturer. Using spare parts and accessories authorized by the manufacturer is in the interest of safety. Use of other parts may exempt the manufacturer from any liability.

### 4 Transportation and Storage

Protect the pump against damage when transporting. The pumps may only be transported in a horizontal position and hooks or straps must be attached on the motor and pump end.

Do not use the pump shaft for connecting any transportation aids such as hooks or straps.

Pumps must be drained prior to their storage.

Store pump in dry and protected areas and protect it against penetration of foreign bodies.

Always store pump above the freezing point!

## 5 Installation and Connection

### 5.1 Mechanical installation

During any assembly or disassembly process the pumps must be secured against tipping through ropes for example at all times.

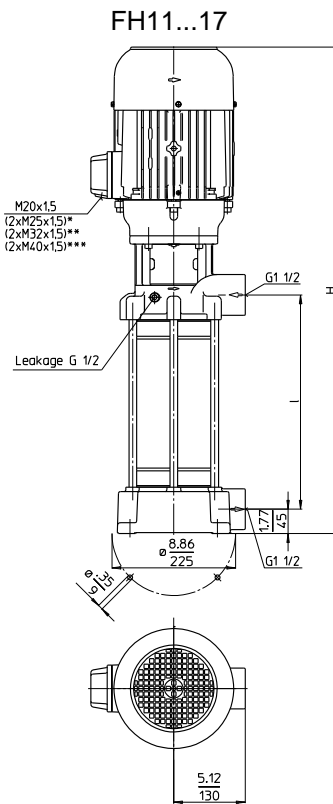
Pumps must be mounted securely. Piping, tank and pumps must be mounted without any tension.

The liquid entrance is situated at the pump body. The pressure connection is at the connection cover in the end of the pump unit (They are marked with arrows).

Possible leakage will be caught by a leakage chamber and returned to the tank by means of a leakage line from the leakage bore on the upper side of the flange.

To obtain the full flow rate it is recommended to choose for the pipework the nominal bore diameter of the pumps cross section for connection. Therefore pipe bends should be used, not pipe angles!

The pipework must be qualified for occurring hydraulic pressure.



Dimensions in Inches / mm

\*) Dim. for 6.7 HP to 13.8 HP, \*\*) Dim. for 17 HP, \*\*\*) Dim. up 23 HP

### ATTENTION

**Pay attention of the max. tightening torque for piping connection**

Type	Pipe connection	Cast iron
FH11...17	G 1 1/2	110 ft. Lbs (150 Nm)

**When installed the space around the pump must be large enough to provide sufficient cooling of the motor.**

**The suction port cannot support the weight of the supply pipe.**

### 5.2 Electric wiring



**All service work must be carried out by qualified service personnel. Pump must be disconnected from the power source and all rotating parts must stand still. Reassure that pump is disconnected from power source and cannot be switched on. Verify that there is no voltage at the terminal board!**

According to the European Standard EN809 a motor overload must be installed and properly set to the full load amps stated on the pump name plate.

It is the responsibility of the machine operator to decide whether or not an additional emergency switch must be installed.

#### 5.2.1 Circuit



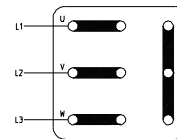
Tension voltage and frequency must correspond with the shown specification on the nameplate.

The pump must be wired so that a solid longterm electrical connection is ensured. Establish a solid ground connection.

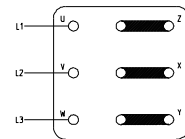
**The electrical wiring must be performed according to the wiring diagram shown inside the terminal box cover. (Please see above sample wiring diagrams)**

Wiring diagram e.g.

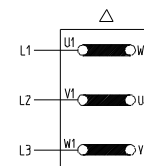
**Up to 13.4 HP**  
**Voltage changing 1:2 YY / Y**  
**e.g. 230 / 460 V, 60 Hz**



**YY**  
**Low Voltage**



**Y**  
**High Voltage**



**23 Hp**  
**Delta connection**  
**3 x 460 V, 60 Hz**

There may be no foreign objects such as dirt, particles or humidity inside the terminal board.

Mount terminal board cover to motor tight against dust and humidity and close up all unused wiring ports.

### ATTENTION

When Variable Frequency Drives are used interfering signals might occur.

Non-sinus shaped supply voltage from a variable frequency drive might result in elevated motor temperatures.

## 6 Start-up / Shut-down

### 6.1 Start-up

#### ATTENTION

Switch off at the mains.

After connection the electrical wires, close the terminal box. Briefly start the motor (max. 30 sec.) and check the rotation according to the arrow on the top of the motor.

If the direction is incorrect change over two of the power leads.

### 6.2 Shut-down

All service work must be carried out by qualified service personnel. Pump must be disconnected from the power source and all rotating parts must stand still. Reassure that pump is disconnected from power source and cannot be switched on. Verify that there is no voltage at the terminal board!

Open terminal box and disconnect the power leads.

Empty out the pump.

## 7 Operation

### Liquid level

The valve on the suction side of the pump must be opened 1 or 2 seconds before starting up the pump to avoid the damage resulting from low pressure.

Do not switch on pressure boosting pump FH before positive inlet pressure by a primary pump or by a static head pressure (from a central filtration system) is established. Max. inlet pressure 375 PSI (26 bar).

CAUTION: avoid hydraulic shocks!

Care has to be taken that the pump station will not run empty.



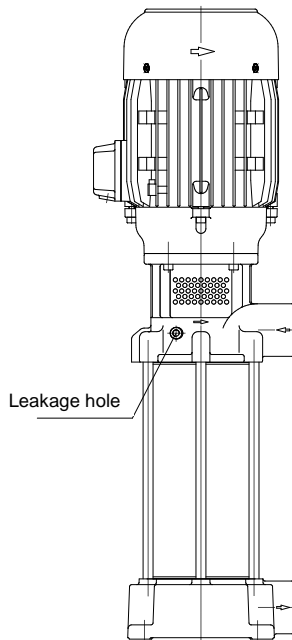
If the pump should lock up and cease, shut pump down (see 6.2) and disconnect from power supply. Pump must be uninstalled and removed from the system prior to its repair.

## 8 Servicing and Maintenance

#### ATTENTION

The surface of the motor must be kept free of dirt.

The motor shaft is spinning in permanently greased ball bearings (with special grease and increased bearing play) and does not require any special maintenance.



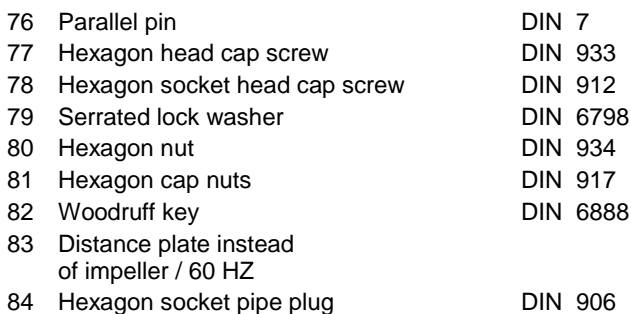


## 9 Troubleshooting Guide

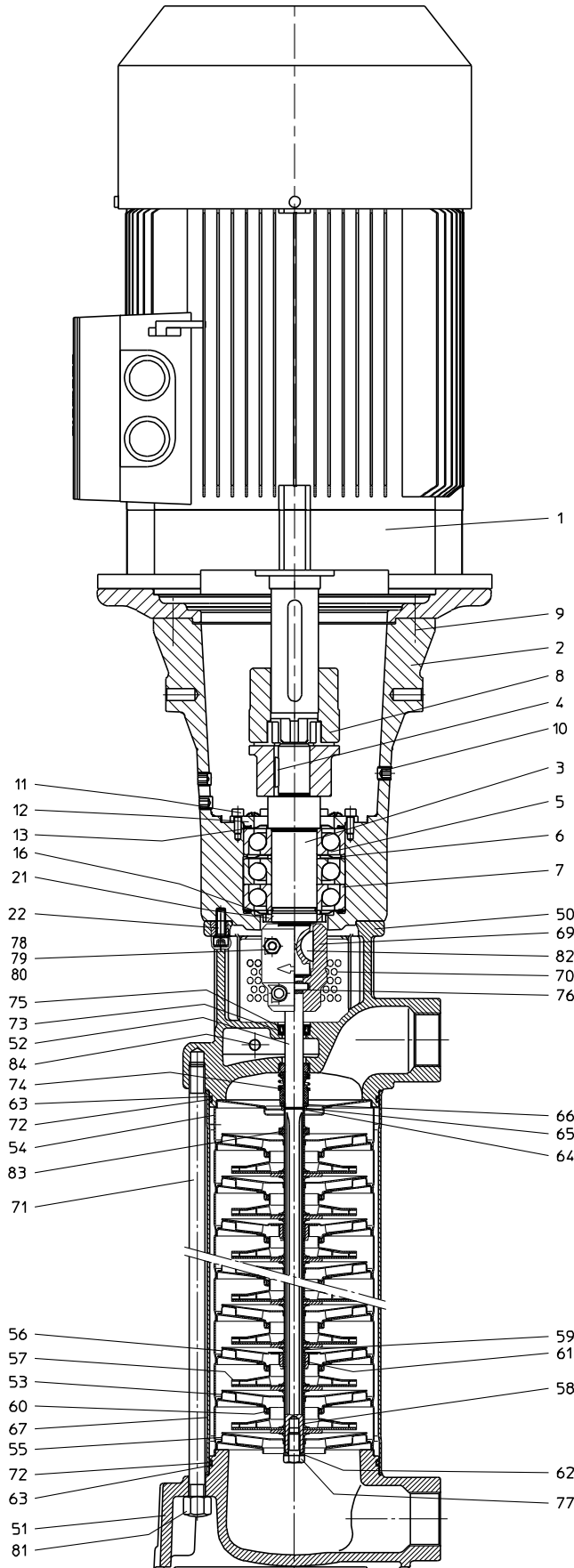
Fault	Cause	Remedy
Motor does not start, no motor noise	At least two of the power supply leads have failed	Check fuses, terminals and supply leads .
	Overload has tripped	Inspect overload
Motor does not start, humming noise	One of the supply leads has failed	See above
	Impeller faulty Motor bearing faulty	Replace impeller Replace bearing
Overload trips	Pump locked up mechanically	Inspect pump hydraulics
	High on/of cycling frequency	Check application
Power consumption is too high	Wrong direction of rotation of impeller	See above
	Lime or other deposits mechanical friction	Clean pump mechanism repair pump
Motor overheats	High on/off cycling frequency	See above
	Wrong power supply (voltage or cycles)	Power supply must correspond with name plate rating
	Insufficient cooling	Check air flow at motor fan
Pump does not pump	Pre-pump does not work	Check the pre-pump
	Pump mechanism faulty Pipe blocked	replace pump mechanism Clean pipe
Insufficient flow and pressure	Wrong direction of rotation of impeller	Change over two power supply leads
	Pump mechanism silted up Worn pump mechanism	Clean pump mechanism Replace pump mechanism
Incorrect flow or pressure	Wrong power supply (voltage or cycles)	Power supply must correspond with name plate rating
Running noise/Vibration	Foreign objects in pump end	Remove foreign objects
	Impeller damaged Bearing/Bushing broken	Replace impeller Replace bearing/bushing

## 10.1 Spare part list for Pressure Boosting Pumps Series FH11, FH1402S18...FH1408S47

### Item Description

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**10.2 Spare part list for the pressure boosting pumps series  
FH1409S57...FH1412S66**



**FH1707S47...FH1711S66**

**Item Description**

1	Motor	
2	Bearing housing	
3	Bearing shaft	
4	Woodruff key	DIN 6888
5	Ball bearing	DIN 628
6	Distance plate	
7	Ball bearing	DIN 628
8	Coupling	
9	Socket head cap screw	DIN 912
10	Threaded pin	DIN 705
11	Bearing cover	
12	Socket head cap screw	DIN 912
13	Nilos-ring	
16	Nilos-ring	
21	Shaft nut	
22	Socket head cap screw	DIN 912
50	Pump body	
51	Connection cover	
52	Pump shaft	
53	Diffusor with sliding ring	
54	Entering stage with sliding ring	
55	Outflow stage	
56	Bearing stage with sliding ring	
57	Impeller	
58	Spacer-long 2 x per stage	
59	Spacer-short 1 x per bearing stage	
60	Sliding ring	
61	Shaft sleeve	
62	Supporting ring	
63	Spiral backup ring	
64	Mech. seal stop ring cover	
65	Mech. seal stop half-ring	
66	Mech. seal washer	
67	Pump casing	
69	Clamp coupling	
70	Coupling shield with M5 screw	
71	Stud bolt	
72	O-ring	
73	Rotary shaft seal	
74	Mechanical seal	
75	Retaining ring	
76	Parallel pin	DIN 7
77	Hexagon head cap screw	DIN 933
78	Hexagon socket head cap screw	DIN 912
79	Serrated lock washer	
80	Hexagon nut	DIN 934
81	Hexagon cap nuts	DIN 917
82	Woodruff key	DIN 6888
83	Distance plate instead of impeller / 60 Hz	
84	Hexagon socket pipe plug	DIN 906

### 10.3 Indications to the spare part order

Spare parts are available from the supplier.

Standard commercially available parts are to be purchased in accordance with the model type.

The ordering of spare parts should contain the following details:

#### 1. Pumptype

e.g. FH1407S47

#### 2. Pump No.

e.g. 08156214

The date of the construction year is a component of the pumps type number.

#### 3. Voltage, Frequency and Power

Take item 1, 2 and 3 from the nameplate

#### 4. Spare part with item No.

e.g. Impeller item No. 57

## 11 Repair

### 11.1 Exchange the rotary mechanical seal: FH11...FH17

- 1) Disconnect the pump from the power supply.
- 2) Loosen the M5 screws and pull out coupling shield (70). Remove clamp coupling (69.1, 69.2) and parallel pin (76).
- 3) Loosen and pull off the hexagon cap nuts (81), the stud bolt (71), connection cover (51) and the pump casing (67) from the pump unit. Remove pump unit with pump shaft (52) from the pump body (50).
- 4) Take off rotating axial face seal unit (74.1-74.5) and mech. seal washer (66) from the shaft (52) and clean the shaft. Pay attention to the drilled hole for the parallel pin (76) that it is without any bur. Check the sliding surface for the rotary shaft seal (73) for any damage.
- 5) Remove complete seal (74.6, 74.7) from the pump body (50) and clean the seat.
- 6) Mounting of the new axial face seal :  
Ensure that the sliding surfaces of the ring and the rotating axial face seal unit are free from grease and dirt.  
Moisten the angle-sleeve (74.7) of the counter ring lightly with rinse water / (water with washing-up liquid) and push the unit into the seat of the pump body (50).  
Slide the mech. seal washer (66) first and then the axial face seal (74.1-74.5) onto the pump shaft (52).
- 7) Lubricate lightly the lip of the rotary shaft seal (73) and push it into the pump body (50). Then insert the pump shaft (52) with the pump unit through the rotary shaft seal (73).
- 8) Fit together the coupling clamp (69) with the parallel pin (76) around the shafts, tighten the hexagon socket head cap screws (78) with the serrated lock washer (79) lightly.  
Be sure that the key of the motor shaft (4) coin-

cides with the key groove of the coupling clamp (69.1). Press the pump shaft (52) toward the motor and tighten the screws.

The distance between the two shaft ends **must be zero**.

#### 9) Lubricate the O-ring seal (72)

Put on the spiral-backup ring (63), the O-ring seal (72), the connection cover (51) and the pump casing (67) and screw evenly the stud bolt (71) and the hexagon cap nuts (81).

During the assembly from (63) and (72) take care of the order. See the pump drawing.

#### 10) Fit the coupling shield (70) into the pump body (50) and tighten the M5 screws.

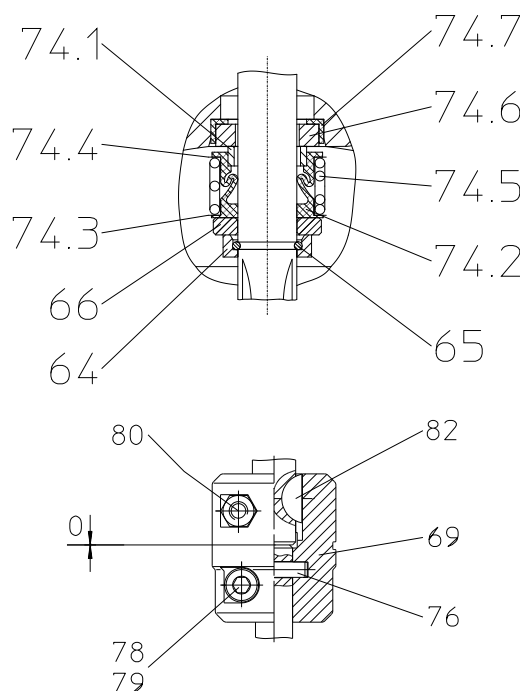
#### 11) Reconnect pump to the power supply.

Note torques for the screw connections!

When putting the pump back into use, **make sure the direction of rotation is correct!**

### Tightening torques for screwed connections

Thread - Ø	M4	M5	M6	M8	M10
Strength classes	4.8	4.8	8.8	8.8	8.8 / 10.0
Tightening torque ft. lbs. (Nm)	<b>0.7 (1)</b>	<b>2.2 (3)</b>	<b>3.3 (4.5) 15 (20) Clamp coupling</b>	<b>11 (15) 22 (30) Clamp coupling</b>	<b>22 (30)</b>



## 12 Disposal

When disposing of the pump or the packaging materials the local and national regulation for proper disposal must be complied with.

Prior to its disposal, the pump must be completely drained and decontaminated if necessary.

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## 13 WARRANTY

Brinkmann Pumps, Inc. warrants that the product contained herein conforms to the description in Brinkmann's catalog and that if this product shall fail to conform to the description thereof or to any express or implied warranty, Brinkmann shall, upon written notice of such nonconformity within one year of the date of its shipment from BRINKMANN'S plant, repair or replace such non-conforming material at the original point of delivery. Brinkmann will furnish instructions for disposition of the goods. If, however, Brinkmann provides a written warranty, as to this specific product, which is not in conformity to the above warranty, then as to such specific product, the specific written warranty shall prevail.

In addition to the warranty that this product will conform to the description in Brinkmann's catalog and that any such non-conforming material will be repaired or replaced, as above stated, BRINKMANN further warrants that it conveys good title to this product, free of all liens of any kind whatever unknown to the first Buyer. These are the sole warranties of BRINKMANN with respect to this product. BRINKMANN MAKES NO FURTHER WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS ARE HEREBY DISCLAIMED BY BRINKMANN AND EXCLUDED FROM THIS SALE.

The Buyer's exclusive and sole remedy on account or in respect of the product herein contained that does not conform to the description thereof, or to any express or implied warranty, shall be to secure replacement thereof as aforesaid. BRINKMANN shall not in any event be liable for the cost of any labor expended on any such material or for any special, direct, indirect, incidental or consequential damages to anyone by reason of the fact that such goods do not conform to the description thereof or to any express or implied warranty.